CONSTRUCTION FIRE SAFETY COALITION

Basic Fire Precautions During Construction of Large Buildings

FIRE SAFETY MANUAL 1

AMERICAN WOOD COUNCIL

The American Wood Council is an independent organization that provides independent, non-proprietary information about timber and wood products to professionals and companies involved in building design and construction.

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Woodaware.com

Modernfirefighting.com

Constructionfiresafetypractices.com

Contents

INTRODUCTION

This manual is part of a series of informational pamphlets and an information distribution system designed to inform individuals on how to reduce fire losses in a very specific category; ***fires in building under construction***.

There are three documents in the series. They are;

Basic Precautions during Construction of Large buildings,
Hot Work during Construction of Large Buildings, and
Fire Department's Role in Prevention and Suppression of fire during Construction of Large Buildings.

This series is based upon a premise that has been developed after conducting an extensive literature search into the experience of the construction and fire protection industry over the last 35 years. The premise is this:
Fire is no accident!

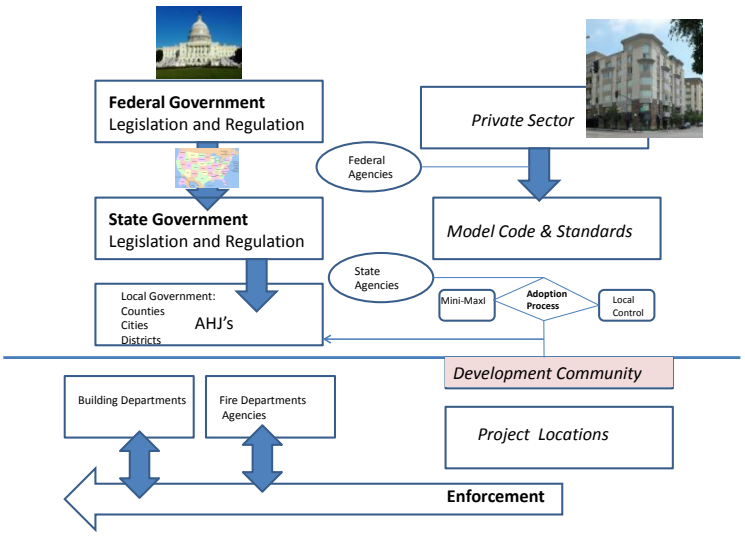
Fires are caused, in one way or another. In some cases the fire is a result of something a person did. In other cases a fire is caused because of what someone has not done, in either case the fire that results from these two different behaviors can result on total destruction of a building under construction.

In a word, preventing fires as the number priority of all parties that have a role to play in this phenomenon. When a military aircraft drops a bomb on a target it is often called "Ground Zero" Therefore, we have labeled the point of origin of a fire as Fire Zero.

There are multiple reasons why this topic is timely and relevant. The first is that the frequency and consequence of this type of fire is attracting attention in both the public and private area. These types of fires impact the surrounding community, business climate, and homes. They can result in property damage, workers and fire suppression forces injuries. And, they can have an effect upon the reputation of the company involved.

More importantly, they can be prevented to a large degree by adhering to the existing model codes and standards that have been written for such purposes.

This project is based upon a model of codes and standards that already exist in the construction industry. These include several different families of codes that have similar, but not identical requirements and standards that are almost universally accepted by local government that oversees most construction in the United States. Secondarily, the project does not anticipate any new staffing or procedural enhancements. This project does not anticipate additional requirements. The focus is upon compliance and awareness of the existing codes and standards



1. Scope of this Manual

1.1 Manual Scope

This manual provides information to help the broad range of people and organizations charged with responsibilities for fire and life safety on a construction site to follow best management practices. This includes the developer and subcontractors, the local building department and the local fire department. The purpose is to reduce the risk of losses and injuries from fire. The Occupational Safety and Health Administration (OSHA) requires that every employer adopt a written code of Safe Practices. (Title 29, CFR Part 1910 sub parts E & L; and Part 1926 sub parts C & E) These practices should be specific to potential sites.

The information applies to the design and planning stages as well as the actual construction phase of buildings. Many hazards can be addressed before they become an issue by the adoption of best management practices.

The primary focus of this document is on large buildings during construction. Other topics that include demolition, alterations, renovations, repair and maintenance, as well as new-completed buildings, may be considered, if appropriate.

This document provides guidance that is based upon compliance with Chapter 33 of the International Fire Code, 2012-2015 Edition and Chapter 33 of the International Building Code, 2012-2015 edition, and NFPA Standards 1, 241 and 1620. The local adoption process determines which one applies.

Much of the content of this guide can be incorporated in:

- The fire protection plan for the site
- Safe work methods and best management practices
- Hot Work permit system
- Fire protection policy and procedures

It is critical that all parties involved in a project work together to ensure that the fire risk is minimized and that everyone on a construction site is aware of their responsibilities.

This guide does not apply to the completed structure that has received its certificate of occupancy. Fire safety in completed buildings is mandated by one of Model Codes. Some states allow local jurisdictions to modify the codes to be more restrictive. Others mandate that the state adoptions prevail over local jurisdiction. These statutes that require compliance with the adopted model code vary from state to state. Legislation may require additional fire precautions to be implemented, such as evacuation plans and emergency procedures. Each state is different.

1.2 Nature of the Problem

National fire organizations, including US Fire Administration and the National Fire Protection Association have been monitoring losses for construction fires in large buildings for decades. The trend and pattern of these fires is significant since it shows that a greater percentage of them result in large financial losses than fires in completed, occupied buildings. Research into the causes and outcomes of these fires point to the concept that accountability and enforcement of existing fire and building codes needs to be improved to understand the problem. Many fires are caught when they are small and do not create catastrophic fires.

1.3 The Responsibility of the Builder

The creation of a safe work environment is the primary responsibility of every employer, as stated. In order to implement and evaluate safety, management must have a comprehensive policy that starts at the

top and goes all the way down to the labor force. The construction industry has made significant improvements. The building owner and/or general contractor must place a high priority on fire safety. Creating a mindset in all employees that fire safety is a top priority is critical. A primary responsibility of the builder is to work closely with the AHJ to ensure that all regulatory requirements are met. This is especially true regarding controlling the permitting process for Hot Work.

1.4 The Responsibility of the Employees

The establishment and maintenance of conditions of work is the responsibility of management while it is also necessary that each employee follows prescribed safe methods.

With this in mind, all employees should be fire -and safety-conscious and:

- Report - all potential fire hazards;
- Observe - all fire safety rules, procedures and codes of safe practice; and,
- Use - the tools, safety equipment and personal protective equipment provided by the company.

1.5 Job Site Visitors

Individuals visiting job sites must check in with the site supervisor for safety reasons. Visitors are required to wear appropriate PPE, to include, at minimum:

- Hard hat and safety vest,
- Goggles, and
- Stout shoes.

Visitor safety tips include:

- Staying visible;
- Remaining alert;
- Being aware of surroundings;
- Never approaching equipment, unless the operator has acknowledged their presence; and,
- Not parking vehicles in any way that would block fire department access.

1.6 Responsibility of Authority Having Jurisdiction

There are three organizations that make up the team that provides representation of local government. They are:

1. Building Department – the role of the building department is to provide enforcement and oversight of the building construction process in accordance with state and local statutes
2. Fire Prevention Bureau – the role of the fire prevention bureau is to enforce the provisions of the adopted Fire Code
3. Fire Suppression Division – the role of the fire suppression division is to develop a pre-fire plan, tactics and strategy and a site assessment of water supply, access to the area and exposure protection.

When buildings are under construction they are vulnerable to fires

1.7 Action to be Taken

The mitigation of fires in buildings during construction requires teamwork of all parties. Everyone that participates in the process has a responsibility to engage in specific behaviors that eliminate causes of fire or improves the response to a fire when it occurs. If the team is coordinated and everyone is accountable for their responsibilities there will not be as great a chance that a fire will occur.

What are the specific things that you can do to improve upon fire and life safety on Constructions sites?

- Understand the Fire and Building Code provisions that are designed to increase safety on-site
- Understand and implement appropriate NFPA Standards
- Train and educate and certify all personnel on what to look for and what to do if a fire occurs.
- Eliminate un-safe practices.
- Identify and follow "best practices."

2. Relevant Legislation and Regulation

2.1 Federal Legislation

While fires on construction projects are not common, when they do occur they do pose a significant risk to a successful construction program, so the risk needs to be managed. OSHA requires employers to implement fire protection and prevention programs in the work place. The regulations that apply to fire protection and prevention can be found mainly in 29 CFR Part 1926, Subpart F of the Construction Standards. The requirement for a fire prevention program is first set out in 1926.24 Subpart C, Fire Protection and Prevention.

This federal legislation and regulation places additional responsibilities on principal contractors undertaking construction work. These include preparing a health and safety management plan that incorporates requirements for signage, and obligations to ensure compliance with other regulations in the workplace.

It also requires persons who commission construction work to consult with the designer on fire safety issues. Businesses are required to control risks associated with construction work and are required to assign duties based on safe work method statements and liaison with other persons as necessary. This process requires designers of structures to provide a written report addressing fire and life safety.

2.2 State Regulation

The ICC produces two documents that are relevant to fire safety in building construction: the International Building Code (IBC) and the International Fire Code (IFC). The NFPA produces a Fire and Life Safety code. These codes are adopted by the individual states. Some sates adopt the ICC family, others adopt the NFPA Standard. In some states, the adoption process allows for local amendments (local control), and other states limit amendments (mini/maxi approach). Chapter 33 in the IBC and IFC, are fundamental code provisions for dealing with buildings under construction. NFPA 1 is a standard that is used in many states to define how specific practices should be completed. NFPA Standard 241 is referenced in most model codes.

2.3 Company Policy

It should be the policy of all construction companies that the health and safety of their employees is of the highest priority. For a program to be a success, active and positive attitudes towards the prevention of accidents is absolutely essential. No employee should ever be required to work at a job site that they believe is not safe. A company's goal should be zero accidents and injuries.

Eliminating unsafe working condition and work practices begins with a company policy that requires that the health and safety of employees be based on established safety rules and policies, as well as procedures that are grounds for disciplinary action if required.

2.4 Action to be taken

This document provides practical fire safety guidance for buildings during construction and has been created as a tool to help people meet their obligations. Because of the variations in State and Federal legislation, this document does not negate the need to undertake risk assessments where appropriate to develop mitigation measures to address site-specific issues and to meet any applicable legislation and regulation.

3. Definitions

ANSI - American National Standards Institute
Code of Safe Practices – A written policy statement that applies to employees, customers and visitors with respect to safety.
Competent Person - A competent person is someone who is perceived to be fit to carry out necessary duties as required and is designated by an employer. They have the authority to take prompt corrective action on the job as conditions warrant.
Exposed combustible materials - Combustible materials that are exposed or with coverings that do not provide adequate protection from expected fire sources such that the combustible core can be readily ignited.
Fire-Resistant Coverings - Coverings applied to elements of construction to increase the fire resistance of the element of construction. Examples include covering systems protecting timber or structural steel (eg. fire-rated gypsum wallboard). The protection required depends on the application.
FRL – Fire-Resistance Levels
Fire Preventative Coverings - Coverings, screens or treatments to combustible materials/elements of construction that reduce the risk of ignition.

Examples include:

- Fire-retardant treatments
- Non-combustible sheeting

FSP - Fire Safety Plan
FPT –Fire prevention team
FPP - Fire prevention program.
Hazard Communication Program – A program intended to provide information relevant to potentially toxic substances or harmful agents that an employee may be exposed to during normal working conditions, or during emergencies.
IIPP –Injury, Illness Prevention Program
Large Building – Definition Required
PAI – Permit Authorizing Individual, as defined in NFPA 51B
PAT - Powder actuated tools. Only trained workers holding a valid operator's card may use a PAT. PATs must meet the provisions of ANSI A10.3.
Pre-Fire Plan – A document produced by an organization that provides guidance on how an emergency might likely be dealt with considering specific conditions on site. The purpose of the document is to provide information to incident commanders handling an emergency. The amount of detail in a pre-plan varies from community to community.
Qualified Person - A person designated by the employer; who by reason of training, experience, or instruction has demonstrated the ability to safely perform all assigned duties; and, when required, is properly licensed in accordance with federal, state, or local laws and regulations.

4. Risks and Hazards

4.1 Understanding the Risk and Hazards

It's no surprise that the construction site can quickly become an unsafe environment. The presence of hazardous materials, combustible materials, the use of power equipment and other hazards make a worksite dangerous.

With flammable and combustible materials present on the building site, fire protection needs to be taken extremely seriously. With so many employees at risk, it's essential that fire safety procedures and products are in place. The objective is to prevent the outbreak of a fire, but also ensure that the premises can be safely evacuated if an incident does occur.

There are a number of assessments that should be conducted on construction sites. These assessments include looking at those factors that can cause a fire.

4.2 Identify the Components of Fire

A combination of heat, fuel and oxygen can result in the ignition of an accidental fire. This commonly called the Fire Triangle.

All employees should be conducing continuous assessment of these elements of fire by trying to keep sources of ignition isolated from sources of fuel. This is very important in the prevention of fire. It is important to identify them as such:

A Source of Heat:

- Smoking Materials e.g., cigarettes, cigars, matches, or lighters
- Cooking
- Open flames
- Electrical equipment
- Light fixtures
- Heat and sparks from grinding and cutting metal
- Arson

A Source of Fuel:

- Combustible refuse and trash
- Building materials
- Flammable gases
- Flammable liquids
- Packaging materials

A Source of Oxygen:

- Normal atmosphere is 21% oxygen

- Additional sources of oxidizers

The description of Basic fire Behavior will be reviewed in more depth in the manual entitled: Hot Work in Construction of Large Buildings.

4.3 Define Conditions That Place Employees at Risk

It is important to identify just who is most at risk. As a developer you should ask questions such as:

- Where are conditions on our work site conducive to fire starting?
- Are employees properly trained to avoid these conditions?
- Can site visitors evacuate safely?
- Are the means of egress clear of obstructions?
- Are our employees properly trained to act when a fire occurs

4.4 Implementation

Use your findings to design and implement your fire safety strategies. Remember to:

- Reduce the risk of fire by constant vigilance;
- Remove or reduce the sources of ignition by preventing heat sources from igniting fuels; and,
- Remove or reduce the sources of fuel through good housekeeping and careful maintenance.

4.5 Communicate the Plan

- Record your findings and the necessary action that should be taken.
- What has been done to remove or reduce the risk you have recorded?
- Are your records available for inspection?
- Inform, instruct and coordinate with your workforce ensuring that fire safety plans are in place.
- Make sure your workforce is trained and drilled in your strategies.

4.6 Evaluate, Review, Revise

The constant monitoring and implementation of both your fire risk assessments and fire safety plan are essential to ensuring the safety of your work site. A walk-through that include various parties from the private and public sector should be done a minimum of weekly. Tool box talks should be regularly scheduled and implemented. In the normal course of construction, there is a constant change in the types of trades and number of employees on site. The constant change that occurs at a construction site means that assessments must be carried out frequently. The specific reasons for a renewed review could be any one of the following:

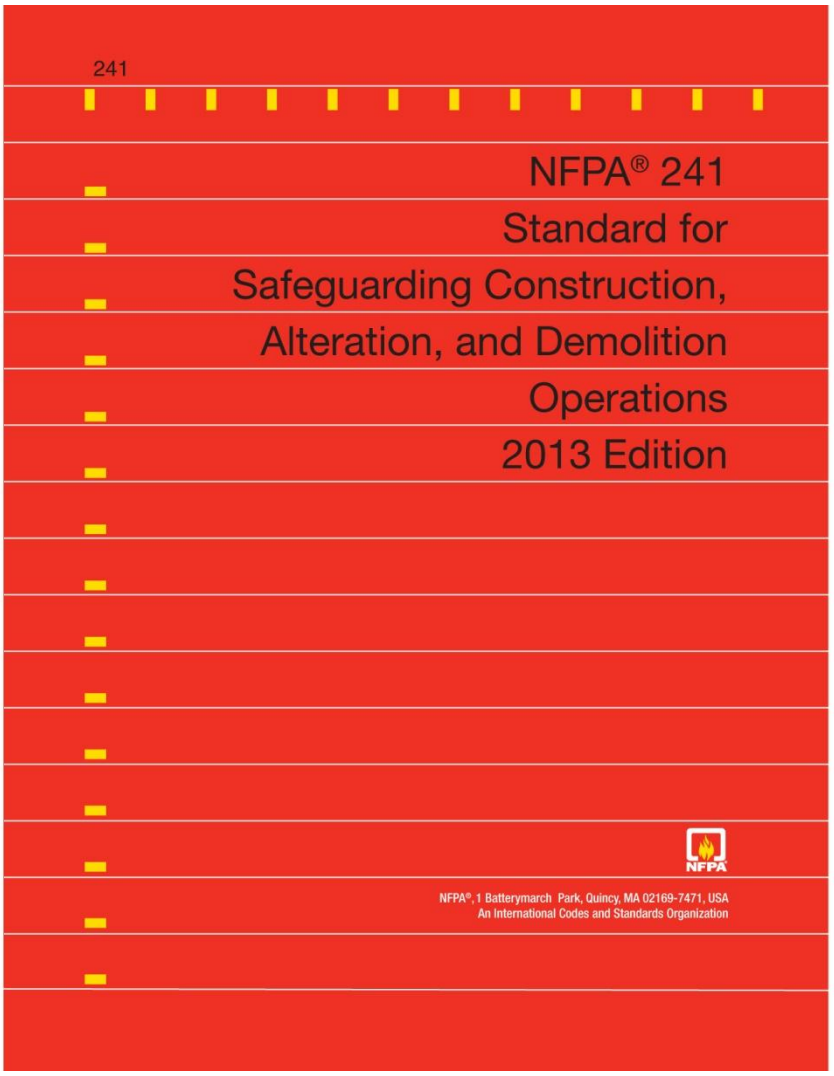
- Change in types or numbers of labor force on site
- Introduction of hazardous materials
- Occurrence of a minor fire or emergency event
- Change in the types and quantities of materials on site
- Changes in water supply, lack of service or problems for access by the fire agency
- Fire department pre-plan

Weekly walk-through and tool box talks should be conducted by the site manager to assure necessary modifications are made to the plan.

Construction sites do not have to be a dangerous environment. Publishing of written policies and procedures that clearly indicate the company's commitment to fire safety followed-up by adequate supervision and discipline can reduce risk to an absolute minimum.

4.7 Action to be Taken

The chain of events that starts with assessing risk and ends with accountability reduces the possibility of serious events. What this section emphasizes is a reality that is often overlooked. Almost all fires start small. Depending upon the combination of the conditions of heat and fuel, a fire can be confined fairly quickly if observed and addressed early, but can grow out of control quickly if not suppressed. A significant part of fire prevention is preventing the combination of necessary fire components in the same location at the same time. But, once a fire has ignited, the priority then shifts to trying to prevent a catastrophic event.



5. Preventing Catastrophic Events

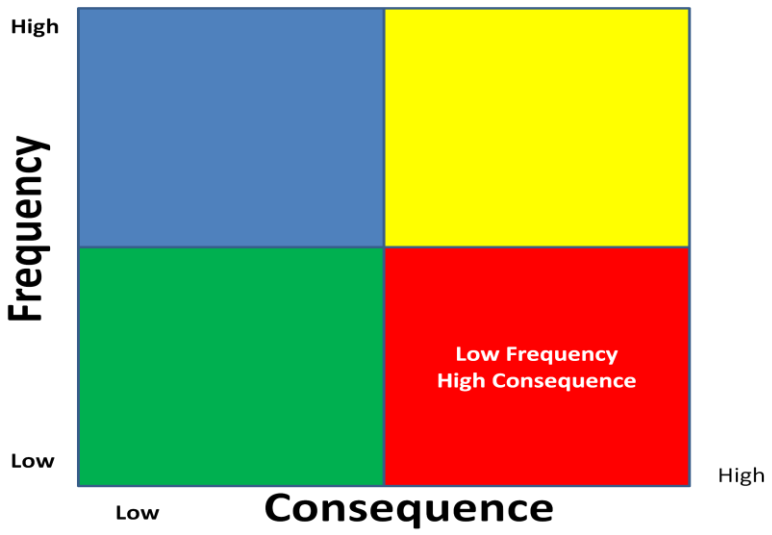
5.1 Role of Prevention

This document was created because of catastrophic events faced by the construction industry over the last decade. The literature search reveals many people active both in the design and construction industry and in the fire service are seeking solutions to this specific problem. Given the complexity of all of the issues, the findings of this research do not support the idea that there is any one simple solution. These events are very rare but when they do occur they are severe. There is a strong suggestion in the literature that the resolution of this problem that offers the best opportunity for improvement has to do with ongoing training, education and heightened awareness among all parties of what constitutes prevention of catastrophic events.

5.2 Low Frequency and High Consequence Events in Construction

In order to manage the risk it needs to be recognized that there are two types of events that can occur on a worksite. The first is a localized problem such as an accident that injures an employee. The second type is a catastrophic event such as a fire or structure collapse. Human nature is such that routine events are easily accepted but catastrophic events are seldom anticipated and difficult to accept.

Contemporary theory on risk management is that catastrophic events can be usually characterized by being of a very low probability but of high consequences. The following illustration provides an overview of the model.



Based on this model it might be suggested that catastrophic events are rare but may have severe impact as stated in the HSE report (RR834). See www.HSE.gov.uk/research/rratm/rr834.htm. The potential consequences of catastrophic events are wide-ranging and long-lasting. The potential impact of a catastrophic event upon a company means that directors and senior managers need to consider risks they are exposed to and manage accordingly. This need generates an emphasis on leadership and risk management.

5.2 Recognizing Risk is a Leadership Role

According to Arnold Glascow, a noted American humor writer “one of the true tests of leadership is the ability to recognize a problem before it becomes an emergency”. This points to the role of leadership as an essential ingredient for making changes to managing risk, and in improving awareness in compliance of the need for emergency action planning.

6. Fire Safety Plan

In order to manage risks and hazards and reduce catastrophic events, there needs to be a plan and a management model in place. In order to have an effective program there must also be a system of accountability.

6.1 Fire Protection Program

According to OSHA a site must have a Fire Protection Program (FPP) incorporated into its Health and Safety Plan (CFR 1926) Subpart F. The Model codes require that the owner implement a pre-fire plan for each new construction or renovation project site in conjunction with the fire department. The program should incorporate the guidelines of NFPA 241 Standard for Fire Safety during Construction, Demolition or Alteration of Buildings.

In order to achieve the goal of having an effective program the primary contractor should assign duties to the overall site manager to include the following provisions:

- Reviewing and approving the Site Fire Protection Program;
- Making the Site FPP information available to all site workers;
- Reviewing Site Fire Prevention Inspection reports;
- Acting to immediately address:
  - Reported conditions that indicate a disregard or indifference to fire prevention
  - Infractions reported that are not being actively resolved in an acceptable manner
- Filing reports for later review;
- Accompanying the Fire Prevention Program Manager on a periodic basis to verify Site Fire Prevention Inspections are being conducted in accordance with the Site Fire Prevention Program. It should be conducted weekly if possible but no less than monthly. During vulnerable phases of construction the frequency may need to be increased; and,
- When weekly project meetings are held, fire safety should be on the agenda.

6.2 Site Fire Prevention Manager

The contractor should designate a person with appropriate knowledge as the Fire Prevention Program Manager for the site in accordance with NFPA 241. This manager should coordinate their activities with the overall Site Safety Manager.

The Fire Prevention Program Manager should develop and implement a written, comprehensive Site Fire Safety Plan.

Based upon the size and complexity of the project and the Fire Safe Plan, a team to support the Fire Prevention Program Manager should be developed. These duties include:

- Conducting daily Site Fire Prevention Inspections to identify potential Site Fire Prevention Program infractions;
- Recording the findings of Site Fire Prevention Inspections in a Site Fire Prevention Inspection report;
- Coordinating with sub-contractor Fire Prevention Coordinators to promptly resolve Site Fire Prevention Program Infractions;

- Recording the results of actions taken to resolve infractions in the Site Fire Prevention Inspection report;
- Delivering Site Fire Prevention Inspection reports to site management on a daily basis;
- Participating in weekly staff briefings or project walk-through.

The contractor should stipulate in all contracts that each project subcontractor is to comply with the Site Fire Prevention Program and designate a Fire Prevention Coordinator who will report to the Fire Prevention Program Manager.

6.3 Implementation of the Fire Protection Program

The contractor should develop and include a Fire Protection Plan in the Site Fire Prevention Program. The plan should authorize the Fire Prevention Program Manager to conduct a daily site inspection to verify that fire protection equipment is available, accessible, and in service. It should further authorize the Fire Prevention Program Manager to pursue and resolve fire protection deficiencies through the Fire Prevention Coordinators.

The plan should include:

- The organizational structure and responsibilities for fire safety;
- The name and contact phone number of the person(s) responsible of compliance with the FPP.
- Arrangements for recording fire safety training/induction given to site personnel and visitors, including required actions in case of fire;
- Risk assessments and fire prevention engineer reports requiring specific fire safety measures;
- Inclusion of fire safety requirements in compliance to the applicable fire and building codes;
- Procedures for reporting emergencies to the fire department;
- Procedures for emergency notification, evacuation and/or relocations of all persons in the building under construction which are aligned with the site emergency notification plan
- Fire prevention measures, including:
    - security requirements, and
    - control of ignition sources;
- Procedures for Hot Work permit operations, cutting and welding
- Electrical supplies and equipment;
- Compliance with 'no smoking' policies;
- Plant equipment and vehicles;
- Prohibition of open fires;
- Control/reduction of combustible materials;
- Control flammable liquids and gases;
- Proper storage and disposal of waste materials;
- Fire department access, facilities and coordination;
- Evacuation plan and procedures
- Fire protection provisions:
    - portable fire extinguishers,
    - standpipes,
    - hydrants, hose reels and water supplies,
    - automatic fire sprinklers*,
    - automatic fire detection and alarm systems*,
    - temporary emergency lighting. *
- Separation from adjacent buildings and other hazards
- Special provisions if work is being carried out in occupied buildings; and

- ❖ Urban wildland interface clearance requirements, if appropriate.

*These items can only be evaluated during the final stage of construction

6.4 Action to be Taken

Having a plan and having accountability for the implementation of that plan is the foundation of assuring fire safety in a structure and on a site. The plan is not just a document for compliance. **It is a guideline for human behavior**. All fire prevention measures are aimed at eliminating a potential cause of a catastrophic event.

There is an old saying; If you only have a hammer, every problem looks like a nail. Fire Protection Planning is more like a tool box with different tools available to handle different problems.. Each tool should be used for its intended purpose.

An excellent resource to study for fire safety plans is located at:
http://www.winnipeg.ca/fps/pdfs/Fire%20Safety%20Plan%20Guidelines.pdf

7. Best Management Practices

All people working on or visiting a construction site should be made aware of the importance of fire prevention and the content of the Fire Safety Plan, including what to do in the event of fire, emergency procedures, location of assembly points and good housekeeping practices.

Training in relation to the use of portable firefighting equipment, safety precautions for those undertaking hazardous operations, and the site-specific emergency procedures must be provided appropriate to the role of the individual.

Records should be kept of fire safety training and inductions given to site personnel and visitors.
The following section address best management practices that are articulated in Model code sections.

7.1 Housekeeping

Having rules for housekeeping is not the same as actually conducting housekeeping activity. Housekeeping is one of those areas that can quickly deteriorate merely from lack of action needs to be taken from supervisors. In order for housekeeping to be effective, it needs to be enforced consistently and enforcement action taken when it is violated.

- Keep premises clear of all kinds of refuse and process waste.
- Identify a perimeter to the property that is clearly marked and ensure public traffic/entrance to the site is prohibited or restricted. (where possible)
- Ensure waste and excess debris or scrap is swept up and removed from the premises at least daily.
- Ensure all areas in and around the building site are kept free from accumulated packing materials, such as empty wooden crates, straw, plastic products, paper, etc.
- Ensure appropriate metal bins (or dumpsters with lids for some items) are provided for disposal of combustible waste materials such as oil rags. This container should be emptied at the end of every shift and contents be taken off site.
- Storage places should be accessible to firefighters.
- Clear spaces around stacks of stored materials and adequate gangways should be present between them.
- If a sprinkler system is installed, all stacks of material should be arranged to ensure they do not impede the effective operation of sprinklers.
- Trash dumpsters to be located at least 50 feet away from the building. The further away the better. If a dumpster is located within the footprint of the building, then a watchman-guard service, if not already utilized should be hired to monitor site fire-prevention.

7.2 Hot Work

Hot work includes any and all activity that could initiate fires or explosions by providing a heat source that ignites combustible material. The following definitions apply to this topic:

- Hot Work – operations including cutting, welding, thermit welding, brazing, soldering, grinding, thermal spraying, thawing pipe, installation of torch-applied roof system or any other similar activity.
- Hot Work Area – the area exposed to sparks, hot slag, radiant heat, or convective heat as a result of the Hot Work.
- Hot Work Equipment – electric or gas welding or cutting equipment used for Hot Work.

- Hot Work Permits – permits issued by the Permit Authorizing Individual (PAI) under the Hot Work Permit program permitting welding or other Hot Work to be done on locations.
- Hot Work Program – a permitted program, carried out by a general contractor allowing them to oversee and issue permits for Hot Work conducted on the job site. The intent is to have trained, on-site, responsible personnel ensure that required Hot Work safety measures are taken to prevent fires and fire spread.
- Permit Authorizing Individual – a person trained in the safety and fire safety considerations concerned with Hot Work. Responsible for reviewing the site(s) prior to issuing permits as part of the Hot Work permit program and following up as the job progresses.
- Torch-Applied Roof System – bituminous roofing systems using membranes that are adhered by heating with a torch and melting asphalt back coating instead of moping hot asphalt for adhesion.

As far as reasonably practicable, activities involving Hot Work should be closely controlled. A permit system should be implemented when Hot Work is conducted. The system should incorporate, as a minimum, the following features:

- Requirements for written permission (a permit) to be obtained prior to commencement of hot works; and,
- Hot works permits must be specific to a location, activity and work period and must not provide blanket coverage for more than one location activity or work period.

Other management practices required to reduce the potential for ignition from any Hot Work activity include:

- Reinforce accountability and ensure that fire mitigation measures are considered at all times
- Combustible materials, especially building construction materials should be at least 35 feet away from the Hot Work area. If they cannot be moved, the area should be covered with a fire-resistant blanket. Floors in these areas should be swept clean of all combustible waste and debris.
- All openings in floors and walls within 35 feet of a hot work area should be covered to prevent hot sparks from entering walls or falling beneath to a lower level.
- Hot Works should never be conducted in the presence of flammable gases, vapors, liquids, or dust.
- Appropriate fire extinguishers should be on hand that are properly sized, fully charged and ready for operation;
- Evacuation paths need to be kept clear
- A suitably trained and equipped person should be assigned to fire watch during the hot works and stays on watch until released by the PIA.
- Inspection of hot works areas at the end of the day by the PAI and by security staff, if on site and it is reasonably practicable and safe to access the area.
- There should be means for communicating an alarm in accordance with a EAP.

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7.3 Electrical Supplies and Equipment

The use of electrical equipment and transmission systems can be an ignition source during construction. Care is required in order to minimize this risk. Consideration should be given to the following:

- All electrical systems and equipment, including temporary installations, must be installed and maintained in accordance with state regulations
- All portable electrical devices and extension cords must be regularly inspected

- Remove any faulty or damaged equipment from use immediately, label it accordingly, and remove from the site or secure it to prevent future use
- Securely fasten any equipment that operates at surface temperatures exceeding 167°F to prevent hot parts of the equipment coming into contact with combustible materials
- Equip fragile components, such as temporary lights, with guards to prevent accidental damage where they are exposed to the risk of an impact
- Low voltage equipment should be used where practicable
- Remove temporary wiring immediately after completing the job it was installed for
- When using metal halide lights for temporary lighting, only fixtures equipped Type O lamps should be used. Any other type of lamp could present a severe fire exposure if it fails prematurely. As well, storage of combustible and flammable materials directly below such temporary light fixtures should not be permitted due to catastrophic lamp failure.

7.4 Smoking Activities

Smoking materials are a significant ignition source for fires on construction sites. Smoking restrictions should be applied throughout a construction site because hazardous materials, such as flammable liquids and gases, may be used in open as well as enclosed areas.

If designated smoking areas are to be provided on or adjacent to a construction site, a specific risk assessment should be undertaken before it is allowed. Smoking areas should be constructed of (or protected by) noncombustible materials and be separated from buildings under construction by at least 20 feet, (or more, if determined necessary by a risk assessment). As well, provide safe receptacles for smoking materials.

Smoking restriction zones must be clearly identified, sign-posted and strictly enforced.

The risk of smoking materials being discarded around the perimeter of the site should be considered and, if the risk is significant, precautions should be implemented. These may include providing fencing around the site.

7.5 Food Preparation

Food preparation that involves the use of open flames should be prohibited. Areas where meals can be warmed utilizing a microwave or other forms of non-flame producing heat should be designated.

7.6 Open Fires/Waste Fires and Temporary Heating Equipment

Open fires, including the burning of waste materials, should be prohibited on the construction site. Combustible waste materials should be regularly removed from the site. Use of warming devices such as heating drums must be controlled. Temporary areas to protect against weather must be outside of any structure. Refueling of heating devices used during construction must be conducted in a safe manner. Check manufacturer's specifications. Where it is to be used, undertake risk assessments.

Any temporary heating equipment should, as a minimum, comply with state and local regulations and be installed, used and maintained in accordance with the manufacturer's instructions. The outcomes of the risk assessment may require additional precautions such as:

- Specification of separation distances from combustible materials;
- Requirement for personnel to be in attendance when the heater is running;
- Restraining the heating device to minimize the risk of the appliance being knocked

over or being incorrectly located; and,
- ❖ Regular inspections.

7.7 Plant Equipment and Vehicles

No vehicles should be parked inside of buildings unless fire detection systems are installed and monitored.

No mobile construction equipment should be stored inside the building without first making sure that the equipment has cooled down and there are no leaks in the fuel or hydraulic system.

Locate plant equipment and vehicles so that their exhausts discharge, as far as practicable, away from combustible materials.

Prevent combustible materials coming in contact with hot surfaces or being close to hot surfaces such as flues/exhaust pipes.

Fuel storage and service areas should not be located within structures under construction, alteration or demolition.

Policies for refueling of tools and equipment should require that the appliance be cool before refilling.

7.8 Stored and Waste Materials

The delivery of combustible materials should be scheduled as far as possible to minimize the time they are stored on site.

Combustible waste materials, including dust and debris, should be removed from the building and its immediate vicinity at the end of each shift or as soon as practicable.

Store scrap lumber and combustible materials before its disposal as far from buildings as reasonably practicable. Store materials susceptible to spontaneous ignition, such as oily rags, in clearly labeled noncombustible containers and remove them from site at the end of each work shift.

Unless specific items of vegetation are planned to be retained, all dry vegetation should be removed from larger sites for a distance of 60 feet from buildings and structures under construction and work areas.

7.8.1 Storage of Combustible Building Materials

Where significant volumes of wood framing and other combustible building materials are to be stored on site, they should be stored in a secure area at least 75 feet away from any buildings or partially constructed buildings, as well as, any location where hot work is undertaken.

Where there are no reasonably practicable alternatives so that combustible building materials have to be stored within or close to the building under construction, the area used for storage should:

- ❖ Have controlled access;
- ❖ Not be in an area where hot works are being carried out;
- ❖ Be in either an area covered by the site fire detection system or included on the route of regular fire checks by watchman-guard service;
- ❖ Have firefighting equipment close by; and,
- ❖ Be protected from ignition sources where reasonably practicable by fire- preventative

coverings (e.g. fire- retardant, fire-resistant, or noncombustible sheeting).

7.8.2 Exposed Combustible Materials

During the construction process, those combustible materials that will be protected in the completed building may be temporarily exposed in locations such as the façade or as parts of wall or ceiling linings. There may be temporary combustible materials in use for the construction phase only. Typical examples of both types of exposed combustible materials include:

- Shade cloths, tarps and other covering around scaffolding, separating work areas and around the site perimeter;
- Combustible façade materials, such as insulation, prior to the completion of siding; and,
- Timber framing.

Once the building is completed, these materials may not present a hazard because:

- They may have been removed from the site;
- Fire-preventative coverings or treatments may have been applied; or
- Fire-protective measures may have been installed, such as automatic sprinkler systems or compartmentation.

During the construction phase, if a risk assessment determines that the volume of exposed combustible materials is significant, additional precautions may be required.

In determining the need or extent for mitigation methods, the risk assessment should consider the proximity of the incomplete building to surrounding buildings, as well as fire safety within the site.

The following are examples of typical additional mitigation measures that could be considered. Shade cloths and tarps and other temporary coverings should be fabricated from noncombustible materials, or fire-retardant materials, where reasonably practicable, so as to minimize the risk of fire spread.

For buildings of four or more stories, where the exposed façade is combustible or the construction is predominantly of combustible construction, one or more of the following additional controls may be considered:

- Exposed combustible materials could be progressively clad with fire-resistant coverings so that the number of stories with significant exposed combustible materials is limited to two below the current construction level.
- If an automatic fire sprinkler system is to be provided, the sprinkler system could be progressively commissioned so that the number of unprotected stories with significant exposed combustible materials is limited to two below the current construction level.
- Early installation of permanent or temporary fire compartments can limit fire spread in the event of an uncontrolled fire. Protection of door openings, windows, shafts and service penetrations need to be addressed.
- A temporary fire alarm system could be provided and evacuation procedures modified to address the expected rate of fire spread.
- Separation distances or fire barriers may be needed between adjacent buildings and the building under construction appropriate to the fire hazard.

7.9 Flammable Liquids and Gases

The storage and use of flammable liquids and gases require specific safety measures that address the risks of use in confined spaces and potential explosions, in addition to normal fire risks. Refer to the relevant Federal, State or legislation as well as NFPA guidelines that address the use of these substances and necessary precautions. This category includes common fuels (e.g. gasoline, for fueling engines and LPG) and acetylene used for cutting purposes. Typical requirements are found in the NFPA Standards. Some (but not all) of the main mitigation methods applicable to fire safety are:

- Gas line purging requirements as described by National Fuel Gas Code;
  - To the outdoors;
  - Continuously monitored to point of discharge, if done indoors then combustible gas detector must be used to monitor point of discharge;
  - Ignition sources kept at least ten feet away from point of discharge;
  - Discharge point at least ten feet from openings and 25 feet from any intakes;
  - Evacuate non-purging employees; and,
  - Purging stopped when 90 percent gas volume reached.
- Instruct and train workers in the storage and handling of dangerous goods.
- Keep storage of flammable liquids and gases to a day's supply;
- Store flammable liquids and gases in clearly labeled containers/cylinders compliant with NFPA Standards in secure areas (preferably an open compound as far as practicable from the building under construction and work areas) when not in use;
- Provide clear signage identifying the materials being stored and prohibiting smoking, open flame, hot works and the use of mobile phones;
- Leakage or spillage must be dealt with promptly and safely
- Keep flammable liquid containers and tanks closed when not in use;
- Segregate storage of flammable liquids and gases from materials that could intensify the fire or present a toxic hazard such as oxygen acetylene and chlorine;
- Properly remove flammable materials in approved containers before work is carried out on an empty container or vessel;
- Liquids may only be used for their intended purposes and can never be used when there are open flames or sources of ignition;
- Consider proximity to flammable liquids and gases in hot work risk assessments.

7.10 Waste/Garbage Chutes

If waste chutes are to be provided, where practicable they should be constructed of noncombustible materials and be located outside the building envelope.

The accumulation of combustible materials close to the chute should be minimized as much as practicable. Dumpsters need to be changed out frequently to prevent the chute from becoming clogged with debris.

7.11 Compliance is Key

Each of the previous sections presents an opportunity to improve fire safety. Omitting any of these practices or performing them in a less than adequate way, generates potential for an unwanted fire event. If a fire event does occur, it is not an "accident" but rather a failure to follow what are well defined practices.

8. Interface with the Fire Department Activity and Emergency Procedures

Regular liaison with the fire department is important. The fire department needs to have knowledge of the site before a fire emergency occurs. This allows for a more effective response.

8.1 Liaison with Fire Authorities

As part of the pre-fire planning effort by the site personnel and the local fire department an initial site plan should be prepared. It should be a diagram of not only the building, but the surrounding area of streets and public access. A process for updated drawings to be available in a fire emergency should be agreed upon as part of the pre-fire planning process. It is recommended that NFPA 1620, Standard for Pre-Incident Planning should be used as guidance for the development of a pre-fire plan.

The pre-fire plan should include, but necessarily be limited to:

- Fire department access points to the site;
- Locations of fire extinguishers and initial attack equipment;
- Any special provisions for firefighting activities;
- The disposition of all built-in fire protection measures;
- Emergency escape routes and stairs;
- Positions of hydrants and hose reels that are operative;
- Any other operative fire safety systems that have been provided;
- Locations of assembly points and registers of persons currently on the site; and
- Details of temporary accommodation and storage areas, including location for storage of hazardous items such as, flammable liquids, gas cylinders, etc.

The fire department should always be made aware of any alternative solutions that are designed to be used in place of required measures or systems that could affect firefighting operations such as shut down of water supply, temporary facilities, or activities that would limit access.

8.2 Water Supplies

The construction program should be planned, as far as reasonably practicable, to maintain adequate firefighting water supplies at all times throughout the site.

The use of American Water Works Association (AWWA) Manual M31, 4th Edition, distribution System Requirements for Fire Protection 2008 may provide useful benchmarks for water supplies.

Regularly update the fire department on the hydrants and hose reels (as well as any other water-delivery mechanisms used) that are operational, and of any potential or actual interruptions to the water supplies.

If the firefighting water supplies are interrupted:

- Prohibit hot work;
- Notify site workers; and,
- Undertake risk assessments to determine any additional actions that should be undertaken while firefighting water may be limited.

8.3 Fire Department Access

Maintain clear and unobstructed fire department access to the site and buildings at all times and notify the fire department immediately of any changes or restrictions to the access points.

If practicable, significant changes to site access should be discussed with the fire department before being implemented.

8.4 Emergency Procedures

Written emergency procedures must be displayed in prominent locations and given to all employees and visitors on site. Clear signs must be provided and maintained in prominent positions indicating the locations of fire department access routes, escape routes, positions of standpipes and the fire extinguishers provided for use by trained staff. Signs should be reviewed regularly and replaced or repositioned as necessary. Typically, they should include:

- Emergency contact details for key personnel who have specific roles or responsibilities under the emergency plan - for example, fire wardens, floor wardens and first aid officers;
- Contact details for local emergency services; for example police, fire department and poison control;
- Description of the mechanisms for alerting people at the workplace to an emergency or possible emergency - for example, siren or bell alarm;
- Evacuation procedures including arrangements for assisting any hearing-vision- or mobility - impaired people;
- Map of the workplace illustrating the location of fire protection equipment, emergency exits and assembly points;
- Triggers and processes for advising neighboring businesses about emergencies;
- Post-incident follow-up process - for example notifying regulatory agencies, and organizing trauma counseling or medical treatment;
- Procedures for testing the emergency plan including the frequency of testing.

In case of an emergency, the actions listed below should be taken immediately:

- If an employee is not trained or does not feel they can extinguish the fire quickly, they should move to a location of safety.
- Any employee discovering a fire should notify all employees in the immediate vicinity of the fire, as well as those in surrounding areas that may be threatened by the fire and they should move to a predetermined location of safety.
- Any employee discovering a fire should quickly and carefully remove any other persons who are injured or in immediate danger, unless doing so will create a more complicated situation.
- If the area or material involved in the fire is small, properly trained employees may attempt to extinguish the fire using approved fire suppression equipment.
- Employees must immediately notify the fire department of the fire.
- The supervisor or designated employee must be notified of the occurrence immediately.
- If the fire appears to be too large and involves a toxic substance, or is electrical- based, employees are to leave the area immediately and notify their supervisor.

Instruct security personnel, such as the guards, to open gates or barriers and provide ready access to the site for the fire department in the event of an emergency, as well as, or their inspection visits to the site.

Assembly points should be clearly identified.

8.5 Action to be taken

When an emergency occurs, time is of the essence. If a fire is discovered, the fire department should be notified immediately even if it is small. The average response time in metropolitan areas for fire departments is about five minutes. The research on this project indicates that it is not uncommon for these types of fires to be of catastrophic size before the fire department even arrives on the scene. Employees should be sensitive to the fact that fire department operations take time once they have been ordered. Having a plan and executing it quickly when an event occurs can often reduce losses.

The First Five Minutes of a Fire are the Most Critical in Controlling It.
Get the Fire Department there As Soon As Possible.

9. Built-In Fire Protection Features

When the following fire protection services are required to be provided in the completed building, the project should be planned to achieve their installation and operation as soon as reasonably practicable.

9.1 Permanent Features

The following components and systems are not considered to be effective in minimizing the risks until they are complete. Conditions may change from day to day, so coordination is important.

- Fire stairs, including fire-resistant walls;
- Fire compartment boundaries, including fire doors, penetration seals and general protection of other openings. These should be completed progressively throughout a construction project to minimize fire spread in the event there is a fire during construction. Where the provision of fire compartments is critical to fire safety during construction, temporary coverings of openings should be provided while ensuring exit paths are not compromised;
- Fire-protective materials to structural steel and fire-preventative coverings over combustible construction, if required;
- Automatic fire sprinkler systems and other automatic suppression systems. Where automatic fire sprinkler systems are required to be installed in a new building, there are significant advantages in progressively bringing the sprinkler system into service on each floor level. In areas of the country where freezing temperatures are common this could be problematic.
- This approach is particularly effective in buildings where the design strategy relies on a sprinkler system to supplement fire separations (e.g. waiving requirements for spandrels or reducing Fire-Resistance Levels (FRL) or for controlling fire spread when combustible materials are exposed during construction; and,
- It should be remembered that there is always a potential for damage to a sprinkler system when other trades and tasks are in operation in their vicinity. Proper procedures need to be developed to assure that damage is prevented in the first place and discovered as quickly as possible when it does occur; and
- Automatic detection and alarm systems need to be protected against damage also.

9.2 Temporary Alarm Systems

Where it is impractical to commission the permanent automatic detection and alarm systems during construction, an alternate means of warning of fire and other emergencies must be established to allow staff to raise an alarm across the site if a fire is detected, and to alert the fire department. Manual devices may be utilized provided that:

- They are distinctive and clearly audible above background noises in all areas;
- All staff and inducted visitors are trained/instructed so that they can recognize the fire/emergency alarm and understand what action to take; and,
- The devices are distributed throughout the site and staff are trained in their use.

Telephone systems can be used to alert the fire services if the emergency procedures adequately specify responsibilities for alerting the fire department and emergency numbers are prominently displayed together with the site address. Emergency phones should be located at strategic points and clearly identified.

9.3 Means of Egress

Construction programs should be planned to ensure that adequate paths of travel to fire exits are provided at all times, taking into account the number of people, activities being undertaken and occupant capabilities.

Regular checks should be undertaken to ensure exits and means of egress are maintained clear of obstructions and provided with clear signage. Typically, this should be undertaken daily or weekly, depending on the risks associated with the site. The frequency should be increased if significant hazards such as blocked exits are observed.

9.4 Fire Extinguishers

At least **one** fire extinguisher per 3000 sf, categorized as a Class A, B and C rating and with appropriate size fire must be provided at all times. They should be installed in accordance with:

- NFPA 10 - Standard for Fire Extinguishers on each story adjacent to each required exit, temporary exit or stairway and
- OSHA 1926.150(c)(1)(i), standard for Portable firefighting equipment

In addition, extinguishers should be provided for fire watch personnel while hot works are being undertaken and at any other locations determined as a result of risk assessments or required as part of a standard safe work practice.

The fire extinguishers should be maintained and regularly inspected, and staff should be trained in the use of manual firefighting equipment.

9.5 Hydrants and Hose Reels

All hydrants and hose reels required by the IBC and IFC for the completed building must be fully operational and any required booster connections must be installed for the building under construction as soon as reasonably practicable.

9.6 Standpipe Risers

Standpipe risers should be installed progressively as construction is undertaken. Hydrants and hose reels required by the IBC and IFC or NFPA 1 for the completed building must be progressively commissioned, as soon as reasonably practicable, on all levels of a building under construction.

9.7 Action to be Taken

All fire protection features that are installed in buildings are there for a reason. All need to be maintained and used properly. They can be compromised easily if attention is not paid to them. The most readily available personnel to notice these discrepancies are those that are working in the area. Diligence is very important in assuring that built-in fire mitigation is not compromised.

Protect and Maintain all Built-In Fire Protection Features

10. Temporary Provisions

The construction process often results in a need for temporary installations. Temporary however is a term subject to interpretation. The primary factor in the definition of temporary provisions is that they will be removed before finalization and occupancy of the project.

10.1 Temporary Buildings

Temporary offices, sheds and construction shanty's should be located separately from other storage facilities having combustible construction or contents. Temporary buildings, as far as practicable, should be located away from the building under construction or other occupied buildings.

Use risk assessment to determine fire precautions within temporary buildings and accommodation including temporary fixed fire protection systems, portable firefighting equipment and alarm systems. Temporary structures located inside of any building should be of noncombustible construction or protected by automatic sprinklers. Temporary structures that are located outside should be separated by a minimum of 30 feet and not closely clustered.

10.2 Temporary Exiting

Existing exits should not be impaired or impeded by new construction. In the event that temporary exiting is required, blocked exits are to be avoided. Temporary floor signs should be provided in any stairwell connecting 3 or more floors indicating the floor number, roof access and direction to exits A stairwell shall be extended upward as each floor is installed with new construction.

10.3 Temporary Heating

Temporary heating equipment shall be listed and installed, used, and maintained in accordance with the manufacturer's instructions. See also Section 7.6 Open Fires/Waste Fires and Temporary Heating Equipment."

10.4 Action to be Taken

Temporary facilities are needed, but they should never be placed in locations where they compromise the ability to maintain fire safety. The planning process should be clearly defined for any temporary installation. The person on site who is responsible to oversee the implementation of the fire plan should monitor any temporary installation.

11. Site Security

11.1 Security Measures in the Fire Safety Plan

Security is required on a construction site for many purposes. It involves preventing theft, vandalism and reducing liability. Preventing arson is one of the most difficult tasks faced by building sites. Therefore, security is a key issue.

Depending upon the size and physical configuration of a building, guard service may be required to maintain the level of safety. When guard service is provided, the guard(s) post orders should, at a minimum, include the following:

- Notification procedures that include calling the fire department and management personnel if an event occurs;
- Knowledge of fire extinguishers and fire control equipment;
- Familiarization with fire hazards;
- Use of construction elevators, if one is used on site; and,
- Providing safety for the security force.

For additional information, see OSHA Publication 3335, https://www.osha.gov/publications/3335

Site security personnel should be issued appropriate equipment for them to make immediate notification to the fire department using the appropriate emergency phone number. The security guard should also know the actual street address for the building and be able to provide the general location of the fire on the site.

The Fire Safety Plan should identify the required security measures, which may include:

- Erecting secure fencing around the perimeter of the site, as conditions permit;
- Securing access points to the site, such as entries to the construction zone during refurbishment of an occupied building;
- Employing 24-hour security guards on larger sites with post orders that include recorded rounds, and supported by intrusion detection systems;
- Storing combustible materials, such as flammable liquids and gases, and potential ignition sources in secure areas, to limit access to materials that could be used to start a fire;
- Illuminating the site so that unauthorized people on the site can be easily identified; and
- Installing intruder alarms in temporary buildings and storage areas, as appropriate.

It can be beneficial for security staff to be trained in the use of portable extinguishers, particularly if they are on site outside normal working hours. Additional details on this aspect can be found in NFPA 601, Standard for Security Services in Fire Loss Prevention.

11.2 Action to be taken

Site security cannot be underestimated. Observation of conditions after hours, and especially when there are abnormal weather conditions, is essential in reducing the possibility of fire. In view of the fact that arson is a significant contributor to fire loss on construction sites then security measures become very critical in protecting the site.

12. Alternative Solutions

12.1 Alternative Materials

Architects and engineers are constantly seeking creative solutions in the design of buildings. This often raises the issue of the performance of a solution in comparison to the prescriptive requirements of the code. Therefore alternative solutions might be needed. This could create some challenges for inspection authorities when installed. The FPP should include notifications and determinations of the use of alternatives when they are allowed in the construction.

The International Building Code, 2012 Edition in Section 104.11 allows that alternative materials, design and methods of construction and equipment are allowed. The provisions of the code are not intended to prevent the installations of materials or prohibit any design or method that is not prescribed by the code. Alternative materials, designs or methods, however, have to be approved by the building official. If the building official finds that the alternative offered is equivalent to the code provision in quality, strength, effectiveness, fire resistance, durability and safety it can be permitted.

Section 104.11.2 describes when testing methods may be required for the approval of alternatives.

The International Fire Code also contains similar provisions in Section 104.9. This section authorizes a fire code official to approve an alternative material or method if that fire code official finds that the proposed design is satisfactory and complies with the intent of the code and further is the equivalent in quality, strength, effectiveness, fire resistance durability and safety.

Accepting alternative solutions is often challenging due to lack of familiarity with proposed alternatives by local jurisdictions. The role of fire protection engineers describing and evaluating alternatives can be critical.

12.2 Action to be Taken

If Alternative materials are approved for a specific set of circumstances, the FPP should include considerations for the fire related issues.

13. Construction Zones within Occupied Buildings

13.1 Common Issues

Renovation and maintenance activities are often undertaken after buildings have received their certificate of occupancy and are occupied. This presents a number of challenges to fire and life safety. The employer(s) of people working in the building and the building owner, in addition to the principal contractor, need to be actively involved in managing fire safety while remodeling or demolition work is undertaken.

Common issues to be addressed include:

- Isolation of existing fire protection systems in occupied areas in addition to those in the construction zone;
- Verification of alarm system performance after adjustments/reprogramming;
- Fire and smoke separation of the construction zone from the occupied areas;
- Security to prevent unauthorized access to work areas;
- Blocking of evacuation paths from occupied parts of the building;
- Disturbance of service penetrations through existing fire separations; and,
- Modification of the performance of smoke management systems and firefighting equipment.

The planning phase is critical to ensure that acceptable safety levels are maintained during the construction phase. The principal contractor should take the lead in preparing a site Fire Safety Plan but senior representatives of the employers of the people working on the premises and the building owner should be involved in developing a plan that addresses all stages of the renovation project.

13.2 Action to be taken

A joint fire safety committee should be established with the responsibility for the establishment, validation and implementation of the emergency plan and procedures for the facility, including construction zones, for the duration of the construction project.

A combined emergency control committee should be established with the responsibilities of individuals clearly defined. It should ensure that issues such as those listed above are adequately addressed in addition to those of a typical construction site or workplace.

Appendix A Site Supervisor Knowledge, Skills and Abilities

This document identifies the inventory of knowledge, skills and abilities necessary for a person to perform the job of "site fire safety supervisor." The assumption is that an individual fulfilling this job has oversight of the performance of various skilled workers onsite. This would involve establishing rules and regulations and compliance strategies to assure compliance federal and state statutes. It assumes that there is policy direction from the corporate entity that requires the use of both supervisors and labor force.

KSA
Knowledge and skills necessary to properly supervise fire safety activities during construction and demolition.
Knowledge and skills necessary to evaluate the code provisions of Model Code including Chapter 33 International Fire Code and Chapter 33 of the International Building Code. and Chapter 16 of NFPA 1
Knowledge and skills necessary to assure compliance with OSHA safety regulations.
Knowledge and skills necessary to utilize the provisions of NFPA Standard 241.
The knowledge and skills necessary to evaluate and properly utilize standpipes, automatic sprinkler systems, fire alarm systems and portable fire extinguishers.
The knowledge and skills necessary to conduct a fire inspection program in an onsite scenario.
The knowledge and skills to perform oversight for security and guard services.
The knowledge and skills necessary to develop and implement a pre-fire plan in accordance with NFPA 1620.
The knowledge and skills necessary to conduct the training of subordinate personnel in the use of all fire protection equipment.
The knowledge and skills to be able to evaluate the operational status of fire protection equipment that has been approved for the specific site.
The knowledge and skills necessary to supervise Hot Work operations including follow-up on permit processes.
The knowledge and skills necessary to evaluate, access and remedy any impairments to any fire protection system required by the code to be installed.
The knowledge and skills necessary to understand how to protect essential equipment that may be exposed to potential damage.
The knowledge and skills necessary to provide emergency information to the local fire department including interface with the incident command system. This task includes the use of pre-fire information.
The knowledge and skills necessary to evaluate any issue associated with access that would limit local jurisdictions ability to combat fires onsite.
The knowledge and skills necessary to evaluate any issue associated with water supply that would limit local jurisdictions ability to combat fires onsite.

Summary

This task analysis is based upon the assumption that site supervisors who have oversight responsibilities for assuring fire and life safety will be guided by company policy directing fire safety efforts at the corporate level. The task analysis is primarily used to define training and education to assure competency.

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